

V. *An experiment on the development of the male appendages in Lepidoptera.* By T. A. CHAPMAN, M.D.

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PLATES XXXVII, XXXVIII.

IN the Proc. Ent. Soc., 1910, p. lx, and more at length in the Proc. South London Ent. Soc., 1910-1911, p. 50, I described (with photographs) a remarkable and so far as I yet know a unique specimen of the ♂ genitalia of *Acronycta tridens* found by Mr. Burrows. I thought it desirable to investigate the matter more fully, and instituted some experiments the results of which I report.

Assuming the ♂ appendages to be internal in the larva and that they come to the surface at the pupal moult, not of course becoming external as in the imago, but presenting on the surface the well-known two tubercles of the pupa, it seemed that some abnormal result would appear if such emergence from the interior could be prevented. In order to attain this result, I produced in certain larvae of *L. dispar* a small cicatrix at the critical position between the ninth and tenth abdominal segments in the midventral line. The result was what I anticipated, the production of specimens almost identical with Mr. Burrows's example of *A. tridens*. The clasps, penis-sheath (*penis-tasche*) and penis (aedeagus and vesica) form a mass in the interior of the abdomen.

The several organs are more or less recognisable, though, for want of the usual position in which to develop, more or less pressed together and distorted. These specimens show, as did Mr. Burrows's, the parts that remain external, as being the actual ninth and tenth abdominal segments apart from the special developments of which the appendages consist.

So far as I can ascertain from the literature bearing on the development of the male appendages, the parts imprisoned thus in the interior develop from a body described nearly a hundred years ago by Herold, and called by him a *Körperehen* (a small body, a corpuscule).

This corpuscule, though apparently a single mass, consists really of two parts, one of which is strictly internal and arises at the extremity of the seminal ducts, the other is external and is an invagination of the posterior margin of the ninth abdominal segment, and some trace of the line of invagination connects Herold's corpuscule with the surface

to guide its emergence at pupation. The invaginated constituents of Herold's corpuscle forms the clasps, which present evidence of being ectodermal structures. The portions of the corpuscle of internal origin form the penis and penis-sheath, which never show any evidence of dermal origin, such as hairs, scales, etc.

I have also seen Professor Meisenheimer's recent essay on experiments by way of excision, transplantation, etc. *Liparis dispar* as a very abundant and hardy insect was the subject of his experiments as it was of mine and many others. The species being the same, the interesting result is that where Professor Meisenheimer excised the corpuscle of Herold in the larva, the imago presented precisely the same development of the ninth and tenth segments as it does in my specimens with the corpuscle imprisoned, but of course in his specimens there is a vacancy where mine show the internally developed appendages.

EXPLANATION OF PLATES XXXVII, XXXVIII.

FIG. 1. Last three abdominal segments of ♂ *L. dispar* × 10.

FIG. 2. Last segment × 25 showing normal structure and disposition of the ♂ appendages.

FIG. 3. Specimen in which the point of exit of the ♂ appendages was occluded in the larval state × 10.

FIG. 4. Portion of the same specimen × 25. These compared with figs. 1 and 2 show the ninth and tenth abdominal segments as in figs. 1 and 2, but without the special sexual appendages, which form a mass lying in the sixth abdominal segment. In this mass the aedoeagus is obvious, as also the clasps, the latter enlarged by still possessing their pupal envelopes. The organs so conspicuous in the seventh segment are merely the spiracles, as may be seen by comparing with other segments and specimens.

FIG. 5. Is a similar specimen × 10, in which the mass has made a nearer approach to the outlet without however breaking through.

FIG. 6. An intermediate specimen with the mass in the eighth segment.

It is very possible that the position of the mass (Herold's corpuscle developed) within the abdomen is accidental and due to movements during preparation of the specimens, figs. 3 and 4 being perhaps least disturbed thereby.

Within one of the clasps in each specimen (figs. 3, 5, 6) is a dark body whose nature I have not determined. In fig. 6 is a separate portion, which is probably a detached pupal covering.